

Appl. No. 10/022,224
Amendment dated March 17, 2006
Reply to Office Action of November 17, 2005

REMARKS

Please consider the following comments. Following this response, claims 1-4, 6-11, 26, 27, and 41-45 are pending. Applicants respectfully request reconsideration and allowance of this application in view of the above amendments and the following remarks.

Objections to the Claims

The Examiner has objected to claims 3, 4, 10, 11, 13, 14, 16-19, 24, 26-29, 34-37, 41 and 43 for a number of informalities.

By this response Applicants have cancelled claims 13, 14, 16-19, 24, 28, 29, and 34-37, thus rendering moot this ground of rejection as it pertains to these claims.

With respect to claim 1, the Examiner has asserted that the noise reducer should reduce the noise *in* the vibration signal rather than *of* the vibration signal. By this response, Applicants have made this correction.

With respect to claim 10, the Examiner has asserted that there is no antecedent basis for the drive wire or output wire. By this response, Applicants have amended claim 10 to depend from claim 41 and to recite "said input wire" rather than "said drive wire." Claim 41 provides proper antecedent basis for both the input wire and the output wire.

With respect to claim 11, the Examiner has asserted that there is no antecedent basis for the drive wire or monitor wire. By this response, Applicants have amended claim 11 to depend from claim 43 and to recite "both said detection wire and said monitor wire" rather than "said monitor wire." Claim 43 provides proper antecedent basis for both the drive wire and the monitor wire.

With respect to claim 26, the Examiner has asserted that there is no antecedent basis for the capacitive variation. By this response, Applicants have amended claim 26 to recite "capacitive

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variation" rather than "*said* capacitive variation." Thus, claim 26 provides antecedent basis for the term capacitive variation.

With respect to claim 27, the Examiner has asserted that there is no antecedent basis for the output electrode or predetermined direction. By this response, Applicants have amended claim 27 to recite "said detection electrode" rather than "said output electrode," and to recite "said second direction" rather than "said predetermined direction." Claim 7, from which claim 27 depends, provides proper antecedent basis for both the detection electrode and the second direction. In addition, Applicants have amended claim 27 to recite "capacitive variation" rather than "*said* capacitive variation," as in claim 26.

With respect to claim 41, the Examiner has asserted that there is no antecedent basis for the subtractor. By this response, Applicants have amended claim 41 to recite "said circuit substrate" rather than "said subtractor." Claim 1, from which claim 41 depends, provides proper antecedent basis for the circuit substrate.

With respect to claim 43, the Examiner has asserted that there is no antecedent basis for the external circuit or the subtractor. By this response, Applicants have amended claim 43 to recite "said circuit substrate" rather than "said external circuit" or "said subtractor." Claim 7, from which claim 43 depends, provides proper antecedent basis for the circuit substrate.

Based on the above amendments and comments, Applicants respectfully request that the Examiner withdraw the objections to the claims.

Claim Rejections - 35 U.S.C. § 112, First Paragraph

The Examiner has rejected claims 17-19, 29, 32-34, and 35-37 under 35 U.S.C. § 112, first paragraph, as allegedly failing to comply with the enablement requirement.

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By this response, Applicants have cancelled claims 17-19, 29, 32-34, and 35-37, thus rendering this ground of rejection moot.

Based on the above comments and claim amendments, Applicants respectfully request that the Examiner withdraw the rejection of claims 17-19, 29, 32-34, and 35-37 under 35 U.S.C. § 112, first paragraph, as allegedly failing to comply with the enablement requirement.

Claim Rejections - 35 U.S.C. § 112, Second Paragraph

The Examiner has rejected claims 13, 16-19, 28, 29, 32-34, and 38-40 under 35 U.S.C. § 112, second paragraph, as being allegedly indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

By this response, Applicants have cancelled claims 13, 16-19, 28, 29, 32-34, and 38-40, thus rendering this ground of rejection moot.

Based on the above comments and claim amendments, Applicants therefore request that the Examiner withdraw the rejection of claims 13, 16-19, 28, 29, 32-34, and 38-40 under 35 U.S.C. § 112, second paragraph, as being allegedly indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim Rejections - 35 U.S.C. § 103

The Examiner has rejected claims 17-25, 29-34, and 38-40 under 35 U.S.C. § 102(b) as being allegedly unpatentable over United States Patent No. 5,969,225 to Kobayashi ("Kobayashi") in view of United States Patent No. 6,119,518 to Itou ("Itou").

By this response, Applicants have cancelled claims 17-25, 29-34, and 38-40, thus rendering this rejection moot.

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Applicants therefore respectfully request that the Examiner withdraw the rejection of claims 17-25, 29-34, and 38-40 under 35 U.S.C. § 102(b) as being allegedly unpatentable over Kobayashi in view of Itou.

The Examiner has rejected claims 1-4, 6-11, 13-16, 26-28, 35-37, and 41-44 under 35 U.S.C. § 103(a) as being allegedly unpatentable over Kobayashi in view of Itou, and further in view of United States Patent No. 6,445,195 to Ward ("Ward"). Applicants respectfully traverse this rejection.

Regarding claims 13-16, 28, and 35-37, by this response, Applicants have cancelled claims 13-16, 28, and 35-37, thus rendering this ground of rejection moot as it pertains to these claims.

Regarding claims 1-4, 6-11, 26, 27, and 41-44, Applicants offer the following comments in support of their traversal.

The present claimed invention, as recited in amended claim 1, teaches a semiconductor device having both a first stray capacitor of a first capacitance and a second stray capacitor of a second capacitance. The first stray capacitor of claim 1 is induced in an insulating film between an input electrode and a conductive substrate, while the second stray capacitor of claim 1 is induced in the insulating film between an output electrode and the conductive substrate.

The present claimed invention, as recited in amended claim 7, teaches a semiconductor device having a first stray capacitor of a first capacitance and second and third stray capacitors both of a second capacitance. The first stray capacitor of claim 7 is induced in an insulating film between a drive electrode and a conductive substrate, the second stray capacitor of claim 7 is induced in the insulating film between a detection electrode and the conductive substrate, and the

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third stray capacitor of claim 7 is induced in the insulating film between a monitor electrode and the conductive substrate.

In the device recited in claim 1, a noise derived from a periodical signal is added to a vibration signal based on the first and second stray capacitors. In the device recited in claim 7, a noise derived from the periodic signal is added to the detection signal based on the first and second stray capacitors, while a noise derived from the periodic signal is added to the monitor signal based on the first and third stray capacitors. To reduce this noise, the devices are each provided with a dummy electrode and a noise reducer.

The dummy electrode in claim 1 is disposed on the insulation film so as to induce a third stray capacitor of a third capacitance in the insulating film between the dummy electrode and the conductive substrate. In this dummy electrode, a dummy signal is generated from the periodical signal based on the first and third stray capacitors. The dummy electrode in claim 7 is disposed on the insulation film so as to induce a fourth stray capacitor of a third capacitance in said insulating film between said dummy electrode and said conductive substrate. In this dummy electrode, a dummy signal is generated from the periodical signal based on the first and fourth stray capacitors. The noise reducer in each device reduces the noise in the vibration signal by using its respective dummy signal.

The Examiner acknowledges that neither Kobayashi nor Ito disclose the use of monitor and dummy electrodes. For this teaching he relies on Ward. However, a careful examination of Ward will show that it provides no such teaching.

Ward discloses a drive feedthrough nulling system having first and second drive electrodes. First and second drive signals having phases opposite to each other are outputted from these electrodes. Drive feedthrough caused by a mismatch between first and second

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capacitances associated with the electrodes is nulled by adjusting relative amplitudes of the drive signals. (See, e.g., Ward, abstract.) More specifically, Ward teaches that a difference in capacitances C_1 and C_2 between drive electrodes 14, 16 and their associated proof masses 20, 22 should ideally be zero. However, because of unevenness in the manufacturing of the capacitances C_1 and C_2 , the capacitances C_1 and C_2 actually differ from each other. Drive feedthrough is caused by a mismatch in the capacitances C_1 and C_2 .

The system of Ward compensates for variations in C_1 and C_2 by varying drive voltages V_1 and V_2 so as to equalize magnitudes of charges Q_1 and Q_2 ($Q_1=C_1V_1$, $Q_2=C_2V_2$). By balancing out the charges induced on the proof masses, feedthrough of the drive signals into the sensor output signals is nulled. (See, e.g., Ward, column 6, lines 32-58.)

However, in the system of Ward, drive feedthrough is not caused by a stray capacitor. Nothing in Ward discloses or suggests the use of a stray capacitor, a dummy electrode or a noise reducer, as recited in claims 1 and 7. In fact, in Ward, feedthrough can be nulled only when two drive electrodes output drive signals having opposite phases. Thus, the system of Ward would not even require a dummy electrode or a noise reducer to null feedthrough.

In contrast, in claim 1, the input electrode receives a periodic signal and causes the movable portion to vibrate, while the output electrode then outputs a vibration signal indicating the vibration of the movable portion. Similarly, in claim 7, the drive electrode receives a periodic signal and causes the movable portion to vibrate, the detection electrode then outputs a detection signal indicating the vibration of the movable portion in a second direction, and the monitor electrode outputs a monitor signal indicating the vibration of the movable portion in a first direction.

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Thus, in claim 1, the periodic signal at the input electrode and the vibration signal at the output electrode do not have phases that are opposite to each other. Likewise, in claim 7, the periodic signal at the drive electrode, the detection signal at the detection electrode, and the monitor signal at the monitor electrode do not have phases that are opposite any of the others. Therefore, a noise added to the vibration signal based on first and second stray capacitors (or the first and third) cannot be removed by adjusting capacitances associated with the electrodes.

The recited devices of claims 1 and 7 are provided with the dummy electrode and noise reducer so that they can remove the noise even when signals inputted to and outputted from electrodes have phases that are not opposite to each other. Both a noise added to the vibration signal and a dummy signal generated in the dummy electrode are both derived from the same periodical signal, so that the noise and the dummy signal has the same phase as each other. This feature is not disclosed or suggested in any of Kobayashi, Itou, or Ward, alone or in combination.

The Examiner asserts that the pick-off electrodes 28 in Ward teach the recited dummy electrodes. However, nothing in Ward discloses that its pick-off electrodes 28 be combined with an input or drive electrode as set forth in claims 1 and 7. While Ward does disclose an in-plane position-sensitive pickoff electrode 28 (See, Ward, column 4, lines 31-33, and FIG. 1), and does disclose that the pick-off electrode 28 produces an output signal which is indicative of the amplitude of the in-plane motion of the proof mass (See, Ward, column 5, lines 19-25, and FIG. 1), it does not disclose or suggest that the pick-off electrode induce a stray capacitor with a capacitance substantially equal to capacitance of a capacitor associated with an input or drive electrode, or that a dummy signal being generated in said dummy electrode from the periodic signal received in said input electrode based on the first and fourth stray capacitors, all as required in claims 1 and 7.

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Claims 2-4, 6, 9-11, 26, 41, and 42 all ultimately depend from claim 1 and are allowable for at least the reasons given above for claim 1. Claims 8, 27, 43, and 44 all depend from claim 7 and are allowable for at least the reasons given above for claim 7.

Applicants therefore respectfully requests that the Examiner withdraw the rejection of claims 1-4, 6-11, 13-16, 26-28, 35-37, and 41-44 under 35 U.S.C. § 103(a) as being allegedly unpatentable over Kobayashi in view of Itou, and further in view of Ward.

Claim Amendments

Applicants' amendments to the claims, noted above, are being made solely to correct informalities and to clarify what is recited by this claim, not in response to any art rejections. Any narrowing amendments to the claims in the present amendment is not to be construed as a surrender of any subject matter between the original claims and the present claims; rather this is merely an attempt at providing one or more definitions of what Applicants believes to be suitable patent protection. The present claims provide the intended scope of protection that Applicants are seeking for this application. Therefore, no estoppel should be presumed, and Applicants' claims are intended to include a scope of protection under the Doctrine of Equivalents.

New Claim

By this response, Applicants have added new claim 45. Applicants respectfully request that the Examiner consider this new claim.

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Conclusion

For all the reasons advanced above, Applicants respectfully submit that pending claims 1-4, 6-11, 26, 27, and 41-45, as amended are allowable.

In view of the foregoing, Applicants respectfully submit that this application is in condition for allowance. A timely notice to that effect is respectfully requested. If questions relating to patentability remain, the Examiner is invited to contact the undersigned by telephone.

Please charge any unforeseen fees that may be due to Deposit Account No. 50-1147.

Respectfully submitted,



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